

EVOLUTION OF THE GRAY'S AND SMALL'S MANUAL RANGES

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"Those who are ignorant of history are condemned to repeat it." To suggest that botanists, and especially systematic botanists, are ignorant of history may seem surprising, exercised as they are with precedents, priorities, author-citations, and bibliographic rummaging. But their history does not go beyond the merely chronological or anecdotal. Critical evaluation, interpretation, explanation, discernment of patterns, precedents for positive actions — there is scarcely even an awareness that such remoter intellectual levels exist. As for introducing sociology, philosophy, psychology — a scientists is above such things. He clings to his scientific purity in his day-to-day work, certain that science cannot help but progress in the soundest possible way.

The sad truth is that science does not advance purely or even chiefly by scientific means. It is, after all, simply one form of human cultural activity, and a victim of the same shortcomings and influences as any other such activity. What seems to me extraordinary is that systematic botanists, the nature of whose work should keep them from the extremes of narrow-minded dogma, remain so stubbornly ignorant of their own condition. Instead of making a broad-ranging, critical scrutiny of themselves, they clutch at devices which will make them respectable in the eyes of true scientists. But salvation does not lie in cytotaxonomy or chemotaxonomy or tabulating for IBM machines. It lies in gaining sufficient breadth and understanding to enable the taxonomist to become master in his house and not the witless object of accidents and outside forces. And this requires stepping outside the narrow cultural limits within which American botany is confined.

In reviewing the history of the familiar "Manual ranges" into which the eastern third of North America has been divided for over a century, I wish to point out that the division does not have a scientific basis, has never been critically examined, and is accepted today out of inertia and intellectual vacuum; that the factors which led to this state of affairs were chiefly economic, social, and political, with mere chance playing a significant role; that while some of these have changed hardly at all, others have changed and are changing in ways of direct importance to the progress of systematic botany; that a knowledge of all of them, changing and unchanging, can enable a botanist to organize his efforts in a way to extract the most from his opportunities and suffer the least from his handicaps. I reject the assertion that "the only thing History has to teach us is that it can teach us nothing."

HISTORICAL RECORD

In 1817 there appeared *A Manual of Botany for the Northern States . . . to the North of Virginia*, by members of the botanical class in Williams College, Massachusetts. A year later appeared a second edition, Amos Eaton now acknowledging authorship. The title for this and the two following editions (3rd in 1822, 4th in 1824) is slightly altered: *Manual of Botany for the Northern and Middle States*, but the specification to *the North of Virginia* (then including West Virginia) remains. With the 5th edition in 1829 the title becomes *Manual of Botany for North America . . . North of the Gulf of Mexico*. What this really meant is revealed in the introductory notice on botanical districts. "The Northern and Southern districts are separated by a line drawn from the mouth of the Delaware River . . . in a direction to intersect the south end of Lake Michigan . . . leaving all Pennsylvania and the north part of Delaware, of Maryland and of Ohio, in the Northern district. This direction of the division line is required, because southern plants extend to higher latitudes on the western side of the Alleghany range, than on the eastern side." These two districts are further broken down into Eastern and Western divisions. "The Alleghany mountain is the division line in the Southern district; a line drawn from the intersection of the Alleghany mountain and the river Potomack, in the direction of Cayuga lake, is the division line in the Northern district." For the following two editions the title and subtitle are unchanged, but this is not true of the botanical districts. In the 6th edition (1833) no mention is made of them, the shock of the arrival of Torrey's edition of Lindley's *Natural System* being so great that Eaton devotes nearly four pages to denouncing it and similar works, omitting the geographic section. With the 7th edition (1836) passion had only partially subsided. Eaton quotes with great satisfaction the remarks of W. J. Hooker in praise of the Linnaean system (in the latter's *British botany*). Parts of Hooker's *Flora Boreali-Americana* (a flora of Canada), had appeared, and according to Eaton, all the information was incorporated in his revised *Manual*. But the only change in botanical districts was a minor one suggested by Western botanists. "J. L. Riddell, of Cincinnati, has been his chief guide in drawing the line between the Eastern and Western regions. The value of the Catalogue of Mr. Gibbs, of Columbia, S. C., kindly sent by the author, was in great measure lost on account of its being received too late" (Preface, p. v.). On page 9, under "Location of Species," we are told that "S. at the end of a specific description indicates that it grows South of the North line of Virginia, as well as North. W. (capital) within the parenthesis after a species, indicates, that it grows West of the Alleghany range and its continuation through Cayuga Lake, &c. — also East of the West line of Missouri and Arkansas." In a footnote we are told of this last statement "This limit is authorised by Drs. Short, Peter, Riddell and Lock." These comments are repeated

in the 8th edition (1840), now entitled *North American Botany; Comprising the Native and Common Cultivated Plants, North of Mexico*, prepared by Eaton and Dr. John Wright. There are three new abbreviations: A. for Alpine, L. (*Littoribus*) for seashore, O. (*Omnibus locis*) for "throughout the Northern and Southern States." There is a further brief section headed "Arctic, Rocky Mt., and Oregon Species," with a confusing second A. for Arctic, R. for "On the Rocky Mt. or west of it; or between the Mt. and the States of Missouri and Arkansas," and Cal. for California. In a footnote in the preface (p. vi), Eaton reports with evident satisfaction, "These five last editions extended to two thousand copies each — and one of them to two thousand five hundred."

Eaton was a teacher and popularizer of botany, not a botanist by virtue of original studies or researches. He was not a notable collector, nor did he attempt to accumulate a good herbarium. Indeed, his final word (p. 16 of the 7th edition) showed that he never even considered careful documentation as a method, for he declares that the only way to assemble adequate geographic data is for every natural history society "to devote a secure place to the preservation of manuscript catalogues of all collecting botanists." He did not travel widely, and his notions of Western and Southern geography were decidedly naive, as the preceding quotations show. Despite the inflated title used for editions 5 through 8 of his *Manual*, he never seriously intended it for use much outside the area of the first four. Thus his comment in edition 8 (p. 16), after explaining the abbreviations for Arctic and Rocky Mountain: "These distant localities will not embarrass the student; because a solitary R. or A. will, at first glance, indicate, that such species are not to be expected elsewhere." It seemed not to trouble him at all that his early, simple separation into North and South and subdivision into East and West had become utterly incongruous; he kept on using them until the last. One suspects that the "distant localities" were thrown in for possible benefit to sales, a suspicion strengthened by his complacent footnote about the number of copies in the earlier editions.

As a compiler rather than an investigator, a rather superficial popularizer instead of a critical student, and finally as a reactionary violently opposing the newer approaches to classification, Eaton did not attract followers of high calibre. Although Mrs. Lincoln's *Familiar Lectures on Botany*, patterned on his own, continued to be a best seller for years after his death, he had no real botanical successor in direct line. But history did repeat itself, though with a difference, in the work of Alphonso Wood, whose *A Class-Book of Botany* first appeared in 1845, and in a revised edition only a year later. As Wood himself tells us (preface to the 1860 edition), "It was originally prepared with immediate reference to the wants of the author's own pupils, with scarcely a hope of approval from the community beyond." It was Williams College all over again, this time at small Kimball Union Academy near Hanover,

New Hampshire. The flora which comprised a major part of the book covered "that section of the United States which lies north of the Capitol, that is, of the 39th parallel, including essentially the states lying north of the Ohio River and Maryland." Then, with an eye to sales, it is added, "With some exceptions, therefore, this Flora will answer for the adjacent states of Delaware, Maryland, Virginia, Kentucky, Missouri, and the Canadas." Like Eaton, Wood was encouraged by the commercial success of his book, and, again like Eaton, became expansionist, with the added stimulus of the desire to keep ahead of the new rival, Gray's *Manual*. For the 1860 edition (3rd copyright date; unrevised new printings of the 1846 editions were confusingly numbered as new editions), "The limit of our Flora in this new series has been much extended. It now embraces the territory lying east of the Mississippi River with the exception of the Southern Peninsula of Florida, and South of the Great Lakes and the River St. Lawrence. . . . This Class-Book is, therefore, now professedly adapted to the student's use from Quebec to New Orleans and from St. Pauls (sic) to St. Augustine." Unlike Eaton, Wood had actually traveled through much of this large area: "Therefore, into nearly every section of this territory, from the St. Lawrence and the Lakes to the Gulf, and from the Sea-Coast to the Great River, the author has made repeated excursions in delighted converse with the vegetable world." But like Eaton he was not a notable collector and did not build the large herbarium one might have expected, though he seems to have done more in this regard than did his predecessor. He too was a compiler rather than an investigator; his primary aim likewise was teaching and popularizing, not research. And, once more like Eaton, he had no botanical successor.

In 1824 John Torrey published the first volume of what was to remain an unfinished work, *A Flora of the Northern and Middle Sections of the United States*, covering the same area as Eaton's early editions: the states north of Virginia. In 1826 appeared the more condensed *A Compendium of the Flora of the Northern and Middle States*, for the same area, this time described as "north of the Potomac." Torrey was to set the pattern for future progress by corresponding and exchanging with European botanists in order to have critical identifications, and by championing the Natural System against the Linnaean. His efforts were to come to full flower in the never-finished *Flora of North America* (1838-1843), undertaken jointly with Asa Gray, and in numerous reports on the collections that began to pour in from newly-explored Western territories. Meantime his fellow New Yorker, Lewis C. Beck, in 1833 supplied a flora using the Natural System: *Botany of the Northern and Middle States*, again stated to be those "north of Virginia." A second edition in 1848 had the slightly modified title *Botany of the United States North of Virginia*. In the same year appeared the famous first edition of Gray's *Manual of the Botany of the Northern United States, from New England to Wisconsin and South to Ohio and Pennsylvania*. It was destined to

be the last manual for the area that may be called the Old North — that it, the area north of the Mason-Dixon line and the Ohio River. Scientifically it carried on the Torreyan traditions of critical identifications and use of the Natural System. But it had still more important reasons for being: it would offset Wood's odious popularity, and affirm Gray's position as leader for the critical botanists, and, not least, it would make money. Prestige, rivalry, and commercialism were to dominate the subsequent history of the *Manual* until the 7th edition and, inevitably, of the later Southern floras as well.

We may never know with certainty all the reasons that led Gray to abandon a regional boundary of more than forty years' standing, adopted first by Eaton, and accepted without question by Torrey, Beck, Wood, and Gray himself. External chance played a part. As late as May, 1855, in a letter to Darwin, he speaks of "this moderate area (bounded by the Atlantic Coast, New Brunswick, St. Lawrence, Great Lakes, Mississippi, and Potomac or Chesapeake Bay)." Darwin's request for information about plant distribution seems to have set Gray thinking. When the 2nd edition of his *Manual* appeared in 1856 (foreword dated June 30), it had been expanded to include "Kentucky, Virginia, and all east of the Mississippi," an area retained for the three remaining editions prepared by Gray himself: 3rd (1857), 4th (1862), and 5th (1867), the last with the range re-worded to "east of the Mississippi and north of North Carolina and Tennessee." (There is some confusion because of various reprintings, the earlier merely as "revised edition" without number; I have followed copyright dates in listing the editions as numbered here.) In an article entitled "Statistics of the flora of the Northern United States," published (1856-1857) just after the appearance of the revised *Manual*, Gray discusses the botanical reasons for the change. "The work, which forms the basis of the following statistics of the botany of the Northern United States, has now been extended in geographical area beyond the limits of the Northern States, politically so-called; inasmuch as this area includes Virginia and Kentucky, and stretches westward to the Mississippi River. The south boundary of 36° 30' has been adopted (instead of Mason and Dixon's line) because it coincides better than any other direct geographical line with the natural division between the cooler-temperate and the warm-temperate vegetation, — between the flora of the northern and of the southern Atlantic states. Few characteristically southern plants advance to the north of it, and those chiefly on the coast of the low south-eastern corner of Virginia, in the Dismal Swamp, and the environs of Norfolk. Could we vary the line where it intersects the longitude of Washington, carrying it north until it reaches the James River, and thence due east again, the small quadrangle thus excluded would exclude nearly all the properly southern indigenous plants now comprised in the volume, and mark the true division eastward between our southern and northern botanical regions, namely, at the northern limit of the Live Oak, the Long-leaved Pine,

and the Black Moss (*Tillandsia unseoides*) . . . On the Mississippi, the plant most southern in character which crosses the parallel is *Jussiaea repens*. This sparingly extends up the Ohio to lat. 38°, where also the *Taxodium* reaches about as far north as on the Atlantic Coast." And prophetically he remarks, "Probably a good many more southern species inhabit this (southeastern) corner of Virginia, of which I have as yet no indications." It was in effect an ante-bellum act of cultural aggression against the South. It passed unchallenged, among other reasons, because there were few botanists in the South (and many of these were, like Darby and Chapman, immigrants from the North), because knowledge of the details of distribution was still very inadequate, and because the whole matter was viewed from a strictly Northern standpoint. State boundaries or parallels of latitude and longitude are hardly ideal for delimiting botanical regions. They were matters of convenience, especially in view of the limited knowledge of the day. Despite the listing of species and plausible sound of his remarks, Gray's new boundary cannot be said to have a solid botanical basis. It did, of course, supply more ample data for answering Darwin's queries, but that is not the same thing. Small, with vastly more field experience than Gray, later considered the Mason-Dixon line a better floristic dividing point.¹

Its convenience was certainly reinforced by decidedly non-botanical considerations. A major purpose in putting out the *Manual* was to make money,² and the enlargement of the area covered could be expected to mean more sales. Whether Gray had by this time gotten wind of Wood's plan to annex the whole South in his next edition I do not know. M. A. Curtis in 1857 warned Gray about Wood's travels in the South,³ and other friends may well have done so early enough to influence Gray's decision on the new boundary. Or perhaps the strategic and commercial benefits to his continuing war with Alphonso Wood were in this case pure serendipity growing out of his efforts to give Darwin a satisfactory answer. I doubt that his motives were pure. Whatever they were, they rigidly fixed the botanical boundary between North and South from that day to this. Although he was too cautious to sweep in the whole South, as Eaton had done before and Wood was to do again in 1860, he eventually felt compelled to stand up to his rival. In 1869 (preface dated 1868), in his *Field, Forest and Garden Botany* (decidedly a commercial venture), he too annexed the rest of the country east of the Mississippi River. Meantime he had induced Chapman to write a Southern flora, published in 1860, about which more later.

Before taking up the short and simple history of the strictly Southern floras, we must follow the subsequent history of the *Manual* and its rivals, the Britton and Brown *Illustrated Flora* and Britton's *Manual*. Other than the minor instance of Darby, Southern botany had no independent existence, but was merely a pawn in the rivalry between Gray and

¹ All notes are at end of article.

Wood and thereafter between the Gray Herbarium and the New York Botanical Garden.

In 1890, two years after Gray's death, there appeared a 6th edition of his *Manual* (copyright date 1889), "revised and extended westward to the 100th Meridian," by Sereno Watson and John M. Coulter. It has been suggested that the extension was due to the fact that both men were Westerners (actually Midwesterners by origin, but both had been active in the Far West). I doubt if the retiring, scholarly Watson would have made such a departure from precedent had he worked alone. It is a thoroughly characteristic action of the aggressive Coulter, ever a schemer, promoter, opportunist, and in general the first major politician in American botany.⁴ It was really repeating Gray's 1856 move, this time toward the West instead of the South. One wonders what might have happened if, in 1890, two botanists from the South had put out a new edition of the *Manual*. I suspect the results would have been exactly parallel with those of the 1890 edition of Watson and Coulter: the annexed territory would prove to have included too much that was foreign to the Old North, and the boundary would have been moved back. This happened with the 7th edition of the *Manual* (1908), by Benjamin Lincoln Robinson (from Illinois) and Merritt Lyndon Fernald (from Maine). "To cover a more natural area . . . some alterations have been made in the geographic limits adopted in the sixth edition. . . . (1) the exclusion of the territory at the west between the 96th and 100th meridians, . . . (2) the inclusion of the Canadian provinces of Nova Scotia, Prince Edward Island, New Brunswick, and the greater part of Quebec and Ontario." The more strongly northeastward slant continued with the 8th edition (1950) by Fernald alone: "The northern limit of range now includes the area south of the Straits of Belle Isle and from Anticosti Island westward along the 49th parallel of latitude in Quebec to the northwestern corner of Minnesota. The western and southern limits are unchanged."

There are curious parallels, and even more curious contradictions, between the events of 1820—1860 and those of 1890—1935. Nathaniel Lord Britton, Ph.D. (in geology), was the first non-medical doctor to write a manual, and the first to adopt the metric system. His one-volume *Manual* was preceded by the three-volume *Illustrated Flora of the Northern United States, Canada and the British Possessions from Newfoundland to the Parallel of the Southern Boundary of Virginia, and from the Atlantic Ocean Westward to the 102nd Meridian*, whose first volume appeared in 1896. With its crude drawings, slovenly taxonomy, and outrageous nomenclature, this was a repudiation of everything for which Torrey and Gray had striven. It was a naked act of imperialist aggression, not only covering the over-extended range of the 6th edition of Gray's *Manual*, but annexing still more territory to the west and north. "For convenience," says the introduction, "the whole of Nebraska has been included . . . a manual of the whole Flora of the northeastern

part of the continent, with the exception of that of Greenland and the Arctic Circle." A second edition in 1913 took in the same area. This dreadful production was still being reprinted and sold as late as 1950. A companion work in one volume, evidently intended to displace Gray's, and similarly titled (*Manual of the Flora of the Northern States and Canada*), appeared in 1901, followed by a 2nd edition in 1905 and a 3rd in 1907. The area for all was much the same as that of the large *Illustrated Flora*: "from Newfoundland and Labrador to Manitoba, the southern boundary of Virginia, Kentucky and Kansas, and the western boundary of Kansas and Nebraska." That Britton's *Manual* failed to displace Gray's is chiefly owing, I believe, to the lack of illustrations. The long popularity of the *Illustrated Flora* was certainly owing to the pictures, which made it a commercial success at the same time that it was a scientific failure. Those not wishing to invest in the expensive 3-volume work would naturally purchase instead that 1-volume work which did have illustrations. There is irony in the fact that the very thing Britton introduced so lavishly in his *Illustrated Flora* was also responsible for Gray's *Manual* defeating his own. Certainly it cannot be said that the general public, whose purchases determined commercial success, gave much scrutiny to scientific merit. Illustrations and commercial success were the only things the *Illustrated Flora* and the illustrated Gray's *Manual* had in common.

Whether it was really necessary to endure the two editions of the *Illustrated Flora* for the sake of progress is a matter of conjecture. Taxonomically speaking they represent the most backward steps ever taken in American botany. But Britton's real contribution was the assembling of the rich library and herbarium resources of the New York Botanical Garden. It may be that from a crudely practical standpoint a popular commercial success had to be produced to accomplish this, quite apart from any question of merit or ethics. In any case, it was possible for Henry A. Gleason in 1952 to put out a work that repudiated nearly everything that Britton stood for. The label "3rd edition" is rightly eschewed for *The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada*, which for quality stands in extreme contrast with its predecessors. Brittonian imperialist aggression is abandoned, though not that of Gray: "Its southern boundary from east to west follows the southern lines of Virginia, Kentucky, and Missouri. To the west, it extends to the west boundary of Missouri, Iowa, and Minnesota, and to the north, it follows the northern boundaries of Minnesota and Michigan. From the eastern end of Lake Superior it follows the forty-seventh parallel of latitude across Ontario . . . to the St. Lawrence River. . . . It excludes Anticosti, Newfoundland, Sable Island, St. Pierre, and Miquelon." A companion 1-volume *Manual* by Arthur Cronquist is in press (autumn 1962); presumably its geographic area will be the same.

The history of the Southern floras is shorter and simpler, and as has

been indicated already, it mainly follows and is subordinate to that of the Northern ones. Only three authors are involved, all of them Northerners by origin, only two actually residing in the South. The first was John Darby of Massachusetts, whose career was somewhat similar to that of his contemporary, Alphonso Wood. His *A Manual of Botany Adapted to the Productions of the Southern States* was published in 1841 at Macon, Georgia, where the author taught at the Wesleyan Female College. This was reprinted at Savannah in 1847. A new edition appeared in 1855 (reprinted in 1869) as *Botany of the Southern States*, published in New York, with preface dated Auburn, Alabama. Just what was meant by "Southern States" is nowhere explained. In the text there are frequent references to the Carolinas, Georgia, Florida, and Alabama, with occasional ones to "S. Western states," to Louisiana, and rarely to Texas. About the author Gray said "he would probably claim to have a good general, but no very profound acquaintance" with systematic botany.⁵ After thus damning with faint praise, Gray proceeded to damn quite brutally by completely ignoring the systematic section of the book in his review, devoting his attention solely to the morphological and physiological portion. Darby's specimens were lost in shipment — the same calamity that befell his contemporary S. B. Buckley a few years later — and it is difficult now to tell whether Gray's contempt for him was altogether justified. The hundreds of localities cited by Darby constituted a really impressive addition to the knowledge of the distribution of Southern plants at that time, and some comment on this was surely in order. Later Chapman, dutifully following Gray's lead, also pointedly ignored Darby's work. Darby himself moved to Kentucky in 1869, after that state had been annexed to the Gray's *Manual* range, and he seems to have given up systematic botany altogether.

A. W. Chapman, also a native of Massachusetts, taught briefly in Georgia following his graduation from Amherst, became interested in medicine, took a degree at Louisville, Kentucky (according to Trelease; Barnhart's footnote in Kimball's reminiscences does not mention this), and spent most of his life practising in northern Florida. In Dupree's life of Asa Gray, surprisingly little is told of the relations between the two men. It is known that Chapman corresponded with Gray, and that the latter encouraged him at length to write a *Flora of the Southern United States*, itemized as Tennessee, North and South Carolina, Georgia, Alabama, Mississippi, and Florida, published in New York in 1860. In his preface Chapman remarks, "My original design did not contemplate so wide a field; but was limited to an enumeration of the plants of the Carolinas, Georgia, and Florida, — to which, chiefly, my attention has been directed during the past thirty years. But, influenced by the solicitation of friends, and by the apparent need of a more general work, I have extended my plan, so as to embrace all the States south of Virginia and Kentucky, and east of the Mississippi River." He adds that "The plan of the work is nearly the same as that adopted by Professor Gray,

in his excellent *Manual of the Botany of the Northern United States*." He also strongly recommends Gray's textbooks to his readers. Like the *Manual* and his own *Flora*, these were all published by the same New York company. It is obvious that Chapman's boundaries were chosen to match those of Gray's *Manual*. Except for his brief comment about having been persuaded to extend west to the Mississippi River, he offers no explanations, botanical or otherwise, for the stated limits. These remain the same for the 2nd edition (1883; reprint of the first with supplement) and 3rd edition (1897). Trelease, who visited Chapman the winter before the latter's death, quotes these remarks by him regarding new species: "But, you know, even if I were not at the end of my work, I should prefer someone else to name them. I never did care to name species, as so many others do." In the preface to the 2nd edition of his *flora* he had said, "And now, since the different sections of all the States which are included have been pretty thoroughly explored, and future acquisitions will, probably, be comparatively few in number," indicating that he did not much believe in new species anyway.

It is an interesting example of the role of chance or coincidence in history that both Chapman and Small were color-blind to shades of red.⁶ But their ideas about new species were in violent contrast. John Kunkel Small, native of Pennsylvania (his surname was an Americanization of Pennsylvania Dutch *Schmal*), never lived in the South, though he made numerous and sometimes extended visits there, chiefly in the Atlantic states, especially Florida. Employed by Britton primarily as curator, he was also expected to implement Brittonian imperialism, with the South (and later the Southwest) as his special territory. Legend has it that Britton, fearful of a destructive fire (it was in the days of gas lights), allowed no one to work at the New York Botanical Garden after dark. He also expected Small to devote his daylight hours to curatorial duties. Small had a large and musical family (he himself had once been flute-player in the New York Philharmonic), and after supper there was a performance by a family orchestra until bed-time for the children. Work on his *Flora of the Southeastern United States* (published by the author, 1903; followed, like Chapman's, by a reprint with supplement as 2nd edition, in 1913) is said to have been carried on during midnight hours, and on the basis of no more than one specimen of each species or sometimes even genus. Those who have used the book will find the story wholly believable. Its taxonomy and nomenclature are thoroughly typical of the Britton school. It was another weapon of political warfare, not a work of careful scholarship. Understandably, its geographic area extends west to parallel that of the *Illustrated Flora*, but for some reason the 102nd meridian was given up for the 100th, thus matching the limits of the 6th edition of Gray's *Manual*. No explanation for the choice is given; neither line makes any sense botanically. It seems to have become clear eventually that the area was over-extended and instead of a 3rd edition there appeared in 1933 the *Manual*

of the *Southeastern Flora* (reprinted in 1953 by the University of North Carolina Press, the first production of a manual in the South since Darby's of 1847), reverting to exactly the limits of Chapman's floras. The parallel with the similar reversion to earlier and narrower limits for the 7th edition of Gray's *Manual* is striking. But imperialism was not being abandoned. There was to be a *Manual of the South-Central Flora* to keep the states west of the Mississippi River in the Brittonian fold, and parts of it were actually written.⁷ But the driving hand of Britton had been removed with his retirement in 1929, Small himself was nearing the end of his life, and his successor-designate, E. J. Alexander, belonged to a generation among whom writers of regional manuals were virtually extinct, and authors even of whole state floras very rare.⁸

We may round out the account of Southern floras with brief notes on another abortive one, and three recently initiated. Less powerful and aggressive than Britton, but like him a representative of the Age of Empire Builders, William Trelease early sought to make the Missouri Botanical Garden a Gray Herbarium of the West, specifically preparing the ground for a *Manual of the Southwestern Flora*, which was to have been written by J. M. Greenman. Trelease himself collected in Louisiana, Arkansas, Oklahoma, and Texas, and made taxonomic studies of such typically Southwestern groups as *Agave* and *Yucca*. He hired numerous collectors, and bought up all available private collections, especially in Texas. Greenman's students were put to work on revisions of genera prominent in the region, and until his retirement he used to state in his annual reports that "progress has been made toward a Flora of the Southwest."⁹ Unlike the rival manual of Small, not a page of it appears ever to have been written. Seemingly all the ingredients for effective results were there: herbarium and library facilities, institutional backing, a trained taxonomist, abundant help, advance planning. Yet the result was complete failure.

History is once more repeating itself, though not exactly; how great the difference will be remains to be seen. Once more broad-scale plans have been made, and facilities and personnel accumulated, this time for an innovation and an anomaly in American botanical history; a regional flora for the Southeast carried down to genera only. It is an innovation and an anomaly on several other counts: it is being done at Harvard, which had never before attempted anything like it; and its geographic limits, taking the Chapman and later Small area with the addition of Arkansas and Louisiana, match neither a predecessor nor a natural area. When first announced in the *AIBS Bulletin* for April, 1956 (p. 26), this was to do more than any previous flora. "This massive project, planned to locate and identify every kind of vascular plant in a thousand mile square area, will have the cooperation of botanists in several southern universities. The study will cover the plants of Alabama, Arkansas,

Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina and Tennessee. C. E. Wood, Jr., of the Arnold Arboretum and Reed C. Rollins of the Gray Herbarium will conduct the study. The project, which is expected to take 20 years, was first proposed and supported by George R. Cooley, a retired Albany, N. Y. banker who has devoted years to the study of the southern flora. The project will now also have financial assistance from the National Science Foundation. Three separate treatises on the vascular flora of the southeast are planned," two volumes to be devoted to the wild flora, a third to the cultivated plants. Twelve cooperating botanists are listed, seven of them permanent residents in the South. For immediate results, it was decided to prepare a generic flora, published as a series of articles in the *Journal of the Arnold Arboretum*. In my understanding of the term, a "generic flora" is not a flora at all, that word properly signifying an account of species.¹⁰ In any case, the "generic flora" (currently appearing at a speed which, if maintained, will require well in excess of another half century to complete) is not comparable with the other manuals and floras here discussed. That it is also incongruous from a historical-cultural viewpoint will be very evident from my following accounts of backgrounds and perspectives.

Lastly there are two regional floras now being worked on by myself. The first in conception (but likely to be last in execution) was a *Flora of the Gulf Southwest*, intended more or less to take the place of the abortive manuals of Greenman and Small, covering Arkansas, Oklahoma, Louisiana west of the Mississippi River, and Texas east of the Pecos. The boundaries, mostly artificial, were adopted in the belief that it was best to concentrate on the area which has never had a flora. Small's *Manual of the Southeastern Flora*, Ryberg's *Flora of the Prairies and Plains*, and Wootton and Standley's *Flora of New Mexico* make it much less urgent to include parts of the states covered by them. In other words, the old method of arbitrary lines was followed out of precedent, utility, and convenience. Purely botanical reasons were involved only in excluding Trans-Pecos Texas; otherwise science had nothing to do with it.

It becomes obvious quite early that a *Flora of the Gulf Southwest* could not be completed without a great deal of study in the states east of the Mississippi River. After some tentative probings in the form of field trips and synoptical studies of wide-ranging groups, a number of ideas gradually took shape. Many of these have been summarized and documented in my synopsis of *Bonamia*, written more for that purpose than for taxonomic reasons. The major conclusions to be stated are first, that a generic flora fills no real need — what is urgently required is a working manual of the species, in the Torrey and Gray tradition instead of the Brittonian, with nomenclature according to present rules; second, that we have progressed sufficiently to begin using botanical boundaries for the Southeast instead of the traditional arbitrary ones; third, that we have now developed library and herbarium facilities that

make it possible to write Southern floras with little dependence on outside resources; fourth, that floras get written because one person makes up his mind to do it, not because of mass-planning. I am therefore actively working on a concise *Flora of the Southeast* as well as a *Flora of the Gulf Southwest*.

HISTORICAL BACKGROUND: CULTURAL

Perhaps the first thing that strikes one about the historical record is the abundance of authors and floras in the North, and their paucity in the South — and the further strange fact that all three authors of Southern floras came from the North. This is exactly contrary to what the much greater richness and diversity of the Southern flora would lead one to expect. Surely, one would think, the stimulation offered by that flora, and the long blooming season, ought to have resulted in far more interest in and study of the plant life by those born in the South. Plainly the reasons are not botanical. That social, cultural, and economic conditions determined the progress of botany is an inescapable conclusion, and the manner and reasons are easily found. Not only can the state of affairs be readily explained in terms of general history, but even small details can be traced to non-botanical origins.

To begin with, American scientists have been overwhelmingly of lower and middle class origins. The rich and aristocratic rarely have cultivated science to the extent of making significant scientific contributions, though some have been financial patrons. We can see at once a major reason why the North alone supplied all the authors of regional floras. Although there existed a landed aristocracy in the Old North, there was never the social cleavage that existed in the South. It was a region of grass-roots democracy, with a comparatively homogeneous population of little men in terms of wealth and power. It was also a region where book-learning was highly regarded everywhere. In New England especially, in the first half of the 19th Century, there developed a passion for exotic and esoteric knowledge that became a lesser tulipomania, together with a missionary zeal to carry the gospel of learning to the West and South.¹¹ What more natural than to write botany manuals amid such cultural conditions? Especially when the shrewd Yankee knew there would be plenty of buyers for his books. There seems to have been an ideal level of urbanization and commercial growth at which the countryside was still familiar, and the pursuit of Linnaeus's harmless science was among the many little luxuries now widely available. Not until the next century would extreme urbanization make inroads into the serious pursuit of botany by non-professionals, and it would then become difficult to disentangle the internal complications, arising from specialization and the rise of more technical aspects of botany, from external blighting influences.

After the Civil War two new factors strongly influenced the development of American botany. One was the appearance of the newly-rich

"malefactors of great wealth" with the great increase in Northern industrialization. The Gray Herbarium was to benefit modestly from the new Northern wealth; Britton was to exploit it as no botanist before or since. He used it to build the New York Botanical Garden and to hire Small; much of Small's field work in Florida was directly sponsored by wealthy individuals. In the South, only the short-lived Biltmore Herbarium near Asheville, North Carolina, came out of the post-war Northern wealth, but this was hardly more than a plaything of the Vanderbilt family.¹² It had scarcely begun to function when it was largely destroyed by a flood, never to be revived; the surviving remnants were eventually turned over to the U. S. National Herbarium.

The second post-war influence was to be very slow in taking effect. This was the rise of a powerful, centralized, Federal government. Ironically, despite long and violent (and still continuing) opposition to centralized authority, the South was to benefit far more than the North from the activities of Federal agencies. In terms of botany, this meant chiefly the work of the Bureau of Agriculture and the U. S. National Herbarium,¹³ and very recently the National Science Foundation, National Institute of Health, and other research-sponsoring units. It is worth noting here that every one of the regional floras and manuals for both the Northeast and the Southeast was entirely a private venture.

In contrasting Southern with Northern conditions, it must be kept in mind that there were really two Souths, or rather three, if Texas is taken into account. This has fateful consequences in the history of Southern botany. The semi-fictional Old South is the Plantation or Lowland South, whose earliest flowering was in Tidewater Virginia. This was dominated by a landed, slave-holding aristocracy which was itself slave to climatic conditions, "King Cotton," and the British textile industry. Before the one-crop economic system had developed a stranglehold (which it did, ironically, with notable help from a Connecticut Yankee: Eli Whitney, inventor of the cotton gin), this aristocracy could produce a Thomas Jefferson, but it never again rose to such an intellectual level. Its members were well educated and well read, but all this was increasingly as part of the social graces, and fitted more and more to the conservative outlook of a leisure class. One did not stoop to the kind of vulgar grubbing that Yankees did; one did not write textbooks, nor get into squabbles about new systems of classification. That before the Civil War Henry William Ravenel of South Carolina, owner of 32 slaves, should study the local flora and put out notable exsiccatae of fungi, was extraordinary — indeed, unique. But Ravenel was only modestly rich, and after the war it was dire need that led him to resume collecting botanical specimens for sale. The deep shock of defeat and ruin did not induce the planter aristocracy to turn to such things as the pursuit of botany for its own sake. They bided their time, eventually regained political control (fossilizing it in the style that until today has kept large city populations under control of rural counties from Georgia

to Texas), and promoted a romanticized image of themselves as the true and only Old South.

The intellectual history of these people is among the most absorbing and perplexing subjects confronting the historians. Because it is so vividly illustrated in the history of Southern botany, it deserves extended comment here. The blighting influence of a slave economy and a dominating oligarchy, so different from Northern conditions, seems obvious. But it is not that simple. The ancient Greeks had a slave economy and ruling oligarchies, but cultural blight was conspicuously not a result. And indeed the Old South in its earlier period did not display the intellectual sterility¹⁴ that characterized it during the height of its political power and has been defensively clung to ever since. Stephen Elliott's *Sketch of the Botany of South-Carolina and Georgia* (1816—1824, 2 volumes) stands even today as one of the finest local floras ever written in the United States. It was the work of a South Carolina banker who had no training in botany. That the Old South never again showed itself capable of producing anything of the kind was but one facet of a growing mental rigidity¹⁵ whose roots were certainly in the South's "Peculiar Institution": Negro slavery. This was a very different thing from slavery among the Greeks. Slaves with them were often prisoners of war, not men born to slavery, and not irrevocably doomed to remain slaves; racism was not involved. And this was slavery in the midst of bustling commercialism, centered in city-states; with an atmosphere quite unlike that of the rural Old South, which remained culturally a frontier region until quite recent times, and was antipathetic toward the rude commercialism so typical of Yankees. The social rigidity imposed by slavery and racism engendered mental rigidity, which was greatly intensified in resisting the forces that were undermining the entire slave economy. Though many even in the Old South believed that slavery would ultimately die a natural death, very few there were eager to see a way of life that was good to them disappear.

Despite the very successful efforts in politics and propaganda by the Plantation South, there was and is another South: the Upland South, or the South of small farmers who owned no slaves. These people were closer to the Old North in social and economic conditions than they were to the Plantation South. That they differed so greatly in intellectual interests and activities (not in abilities; the falsity of the hill-billy legend has been demonstrated by the events of World War II and after) may be explained in part by the fact that they still lived under frontier conditions for decades after the North had become urbanized and industrialized, and in part by the overwhelming influence on the entire South of the politically and socially dominant plantation aristocracy. The most telling influence of the latter was its hostile attitude toward public education. One of the most costly activities of the Federal government during Reconstruction was the

establishment of public schools and the importation of teachers. But when the men of the Old South resumed control, they showed little enthusiasm for such things.¹⁶ Illiteracy was in their view a desirable thing for the non-slave-holding whites and the former slaves both. Simple lack of education made it impossible for botanical manuals to be written or even read by the very people in the South who, judging by what had happened in the North, were most apt to have produced them.

The men of the Upland South were intensely loyal to their home states, most of them supporting the Confederacy without question in a war that was not in their own best interests, and falling in with the political schemes and racism that dominated Southern history afterward. But there were notable exceptions. Eastern Tennessee made one unsuccessful attempt to set up a new state, and "Tennessee Johnson," by refusing to follow his home state into secession, was destined to find himself in the White House, granting presidential pardon to the leaders of the Confederacy, who did not belong to his South. West Virginia, of course, is the conspicuous example of the split between Upland and Lowland South, carried to successful political outcome for the former. North Carolina was never so dominated by the plantation aristocracy as were her neighboring states, and Florida, which for long was sparsely settled, likewise was never fully a part of the legendary Old South. Despite the political catch-phrase "the Solid South," the South is not and never was such a unity.

We shall review the significance of all this in the current and future history of Southern botany shortly. But first we must take up the special case of Texas, which, although a member of the Confederacy, is not a typically Southern state, botanically or otherwise. It is as much Western as Southern, but most of all it is just Texas, never forgetting that for nine years before becoming one of the United States it was a sovereign nation. The Plantation South and negro slavery did spread into the southeastern part of the state, but never attained the level they did in Louisiana and states east of the Mississippi River. Another landed aristocracy, the Cattle Barons, did develop farther west, but by the nature of things it was not numerous nor old, and without slavery did not develop into anything like the Old South. The real core of settlement in the state was an approximately north-south strip down the middle, from the western borders of pine forest out into the rich prairies, with particular concentrations along the margin of the Edwards Plateau with its many springs. The settlers before the Civil War were diverse: many from the Upland South, some from the Middle West, great numbers from Germany and other European countries. In social and economic terms, these people belong with those of the Old North and the Upland South; despite geographic proximity and political association with the Plantation South, they are not an integral part of it. Noteworthy is the fact that of the seven original (pre-

Sumter) states of the Confederacy, only Texas submitted the Ordinance of Secession to popular vote; in the other six it was passed by the ruling oligarchy.

All of the South remained impoverished for long after the Civil War, although Texas did not suffer as much as most. Nevertheless the "Big Rich" so much talked about nowadays are a quite recent phenomenon, as well as a minority. They do, however, mark the first major step in the economic developments which have produced the New South. For Texas it was a special item: oil. For the whole South, it was a complex and varied group of developments in the direction of urbanization and industrialization, given enormous impetus by World War II. We need not go into details. It is enough to point out that although far from having equalled the North, the South is now well along in an economic boom very similar to that experienced in the North a little before and more especially after the Civil War.

When we look back at the history of the various botany manuals, it is easy to see how much of that history is only a manifestation of the general history of the times: of social conditions, economic developments, intellectual climate. Purely botanical matters are of extraordinarily little consequence. Eaton's manuals were popular and influential with the general public, falling in so well with the spirit of the time and the region. But they did not establish either the professional practice or the reputation of American botany. Torrey and Gray did successfully introduce the Natural System, and accomplished much good work; yet the spirit of the age which followed them was such that their efforts to establish a tradition of sound scholarship failed, and their hopes of accomplishing the basic task of writing a complete flora of the country were never realized. The Northeast, thanks to its long democratic tradition, devotion to public education, sympathetic intellectual climate, and earlier and greater economic development, is now supplied with good, recent floras which reflect the benefits of repeated revisions and the prolonged and intensive work of many hands. The South, because of internal social and cultural conditions, had to have its few and very inadequate floras written by outsiders. But social, cultural, and economic conditions are not static, and we have now reached a stage at which we can begin to see the shape of things to come, and the reasons for them. But before proceeding to diagnosis and prognosis, we must briefly fill in the pertinent scientific background.

HISTORICAL BACKGROUND: SCIENTIFIC

The entire history of the manual ranges is one of inadequate progress with the rather elementary job of compiling a catalogue. There is virtually nothing that could be called intellectual development in it, such changes in concepts or techniques as appeared being of external origin, the majority coming from Europe. Following is a list of those developments which were mainly scientific in origin or nature and

which influenced the manuals. Not that they were purely scientific, of course. All had in greater or lesser degree contributing cause in contemporary social and economic conditions, but are most conveniently discussed in terms of their manifestations in the scientific world.

The Natural System.—Linnaeus himself considered his simple procedure of counting stamens and pistils no more than a convenience, to be replaced some day by an approach using many characters. Many of his followers with more limited mental horizons (Eaton among them) would have preferred to keep things simple forever. But the Linnaean System became more and more obviously unworkable as knowledge of the world's flora increased. The organization of that flora into orders and families based on many features, a work almost entirely carried out by Europeans, required much more in the way of critical study and evaluation than before. Torrey's promotion of the Natural System in American botany was but one aspect of his efforts to create a truly critical science on this side of the Atlantic. With its establishment American botany for the first time acquired intellectual substance, however modest.

Darwinism.—Although Asa Gray himself was a leading champion of the theory of evolution, acceptance of it brought no change in his approach to classification. A species was treated as a morphological type which for all practical purposes was constant. Not until the new sciences of genetics and ecology had been born and made some growth could there develop the concept of a species as a population which might include considerable variation. All the manuals and floras that have been published for the two ranges so far have been quite uninfluenced by evolutionary theory. While this was largely by default (only Gleason among the various authors had experience with intensive work in ecology, or had given attention to the philosophical bases in his research), it is as things should be, for the proper function of a flora is to record facts and make them accessible, not to theorize. This point will be elaborated further under *Neo-Darwinism*.

Nomenclatural Codes.—This of course means chiefly the American Code, which represented neither profound thought nor a deep desire to aid science. In its extremism with regard to priority, going outside the genus to find the earliest names for species and creating unnecessary new combinations (in contrast with what Fernald would later refer to acidly as "the sensible and therefore discarded Kew Rule," under which only names already existing within the genus had to be considered), it followed the preachings of a few Europeans like Otto Kuntze in Germany. In its use of undesignated trinomials, it borrowed from zoological practise. Its type method, commonly held up as a great American contribution, was simply a refinement of the "preuves" of Alphonse de Candolle's *La Phytographie*.

Far more significant than its content were the concealed purpose of the Code and the manner in which it was promulgated. It was here

that Britton¹⁷ stooped his lowest to get ahead of the Gray Herbarium. Receiving no support from the Harvard botanists and only scattered support elsewhere, he arranged for "A Committee of the Botanical Club, American Association for the Advancement of Science," a hitherto nonexistent group, made up of henchmen rather suddenly and mysteriously appointed, to put out a *List of Pteridophyta and Spermatophyta Growing without Cultivation in Northeastern North America* employing the hundreds of unfamiliar names required by the American Code. In the preface it is stated with bland mendacity that "the general rules on which the list has been compiled are in accordance with the views of the great majority of North American students of systematic botany." Britton was chairman of the committee, which included no members from Harvard, from the South, the Far West, or Canada. The territory included was "the area of the 6th edition of Gray's *Manual*, with the addition of the States of Kansas and Nebraska, and the Canadian Provinces from Manitoba to Newfoundland." This of course was the territory to be covered by the *Illustrated Flora* whose first volume appeared three years later. At one stroke Gray's *Manual*, with its old nomenclature, had been outmoded. Those who wished to keep abreast of the new would have to buy the *Illustrated Flora* and later Britton's *Manual*. The American Code was a Brittonian device for achieving political power and commercial advantage.

In a period of great corruption in public life, this kind of thing was not unusual. The growing imperialist sentiment of the time, soon to erupt in the war with Spain and to be personified in Teddy Roosevelt, found added attraction in something specifically named the *American Code*. Britton very successfully exploited attitudes and techniques of a society whose ideals were far removed from those of Torrey and Gray. Eventually there were compromises; the International Code of today includes some features from the American one, and is the only code in use. The two most recent Northern floras are essentially alike as to nomenclature, but differ considerably from any predecessors. The South still suffers with Small's *Manual*, nominally following the American Code but not consistent in that respect, and very different from the current Northern counterparts.

The Rise of Technical Botany.—During Britton's own lifetime there occurred a great development in non-taxonomic fields of botany, especially those employing the microscope and the laboratory. These were not involved in disgraceful nomenclatural squabbles, had the attraction of newness, and the appearance of being more truly scientific than taxonomy seemed to be. There is supreme irony in the fact that before he reached retirement, the very science in which Britton had tried to make himself supreme had fallen into disgrace, in great part as a direct result of his own actions. He had made himself the leader not of American botany, but only of a discredited segment of it.

Much of the newer technical botany had little to do with the prepara-

tion of manuals, and botany became more and more a study for specialists. But at least three fields were to have much to do with the attitudes and methods of future writers of manuals: genetics, cytology, and ecology. Only with the aid of these would it become possible to develop the concept of species as population rather than morphological type. But one still of necessity recognizes a population as belonging to a species more by the visible morphology than anything else. Despite much ballyhoo about the "New Systematics," sound taxonomy is not so very far removed from what Torrey and Gray tried to do. This is especially true when progress has hardly advanced out of the primitive stage, as is true of our knowledge of the Southern flora.

Neo-Darwinism.—This exists in its most virulent form among modern vertebrate zoologists, who by virtue of having simple and limited materials upon which to work have progressed so far beyond basic taxonomy that they are no longer really taxonomists at all. It is a measure of the weakness of American systematic botany, reinforced by modern mass culture and the urge to conform, that the botanists have accepted ideas and assertions which do great harm to the sound progress of plant taxonomy. Just as Brittonism had exploited taxonomy as an instrument of political and commercial warfare, so Neo-Darwinism has exploited it as a vehicle for the pseudo-science of phylogeny. Indeed, it has even come to be taught as dogma that the purpose of taxonomy is to construct a family tree, not to be taxonomy at all. Basic taxonomy, as I conceive it, comprises a body of factual information, and serves as the basis for many other kinds of study. Phylogeny does neither; it only diverts taxonomy into a bastard activity between science and fiction. After the twin calamities of Brittonism and phylogeny, it is a marvel that any honest taxonomy still exists.

An important difference between Brittonism and Neo-Darwinism is that while the former still took into account the general public, the latter is meant only for the professionals. It is doubly hostile to the preparation of floras, and ought to be rigidly excluded from consideration by anyone engaged in such work.

Over-all Scientific Background.—It has been said that the 19th was a Biological Century, while the 20th is a Century of the Physical Sciences. There is no question but that writing floras was a more common, more acceptable, and much easier activity during the 1800's than now. In today's intellectual climate, so heavily dominated by the physical sciences and mathematics, with confused overtones of war and space travel, the peaceful writing of mundane floras finds little encouragement. The weak science of botany seeks to borrow strength by adopting techniques from those more powerful. I think it would gain more strength if it sought a clearer understanding of its condition and a firmer grasp on its proper business. At this stage in our progress, I believe the writing of floras is an ideal means of doing both.

Incidentals.—Though I have gone to some lengths to demonstrate how cultural and economic conditions lay behind the greater success of Northern botany, there is at least one contributing factor in the nature of the materials being studied. The flora of the Northeast is smaller and simpler than that of the South. It also has much more in common with that of Europe than does the Southern flora, and the work of European botanists certainly helped to make easier the task of those writing floras for the North. On the other hand, today's Southern botanists have benefits from rapid transportation and communication that facilitate their work in a way never before possible.

HISTORICAL PERSPECTIVES

History is the product of forces. Enough has been said, I think, to demonstrate my thesis that botanical history—specifically illustrated by the evolution of the two manual ranges—is only a minor part of cultural, social, and economic history, and its progress is subject to a host of influences quite remote from itself. Yet the history of a science ought to differ from general history, since science has (at least in short-range view) concrete, specific objectives. Why then has American botany been so completely the victim of circumstances? The answer I believe lies in the failure of American botanists to view themselves and their activities scientifically.

Surely the first task for American botany was to get the country's flora written up and made accessible to everyone, and this task is still unfinished. As a scientific task, it ought to be scientifically delimited, but even this primary step has still not been taken. For the manual ranges, straight lines may be tolerated in a pioneer era, as a matter of practical convenience. But after three generations of Southern floras and more of Northern ones, we have surely progressed far enough to demand something better. We particularly need to have the dividing line scrutinized from the Southern side, not just the Northern.

The imposing array of authors and manuals for the North is matched by an even more imposing array of large herbarium and library collections. The South still lags, but not nearly so much as before. Good and recent herbarium collections are available in quantity at institutions within the South, and although library facilities are less adequate, there is no longer the complete monopoly once enjoyed by the North. Facilities are not a barrier to progress at present.

Personnel is another matter entirely. Not because of small numbers; never before have there been so many Ph.D.'s. But it is precisely here, ironically, that most of the trouble lies. The character, attitudes, and instilled beliefs of the modern American professional botanist are largely inimical to the writing of floras. This means that the most immediate and influential intellectual atmosphere is likewise inimical to such work. We have come back to cultural and social influences, this time at a more immediately personal level.

Must we at this point give up hope of any further scientific evaluation? No; if human history is indeed the product of forces, we have some possibility of the detection and objective evaluation of those forces. In fact we have already done so in recounting the past history of the two manual ranges. One might be led to predict then that their future history will simply continue to reflect the functioning of largely irrelevant forces, and nothing scientific can be done about it. Nothing purely scientific, perhaps, but having demonstrated to what an extent botany is a cultural pursuit, we need not be thus restricted. Let us try to discern some of the influences that are harmful, and need to be resisted, and some that are favorable and need to be aided.

In speaking of Britton and the Age of Empire Builders, I briefly indicated the non-botanical context: the Robber Baron era of corruption, monopoly, power politics, and expansionism. Their work represented a direct importation into "pure" science of contemporary cultural attitudes and activities such as had never before taken place. The next period, overlapping in time with the Age of Empire Builders, I have called the Age of Dilettantes. This was in part a reaction against the immediately preceding period, in part an acceptance of it. The Empire Builders went in for regional and even continental floras, dabbled in all groups, did work of generally poor quality, championed the American Code and all the needless nomenclatural upsets that went with it, and left to their heirs immense herbarium and library facilities — along with a ruined reputation for plant taxonomy as a science. Their heyday saw the great rise of other fields of botany, so strikingly illustrated in the career of that great opportunist, John Merle Coulter. Laboratory botany benefited hugely from the loss of sound scientific standing by taxonomy. The Dilettantes who succeeded the Empire Builders no longer wrote general floras, but specialized (sometimes very narrowly), did work of generally high quality, supported compromises and the International Code, took their rich working facilities pretty much for granted, and — being themselves all Ph.D.'s — went on grinding out Ph.D.'s more numerous than distinguished. The trend toward more careful work received an opportune boost in the form of cytological methods, a European innovation which fit in perfectly with the American flair for push-button gadgets and had altogether phenomenal success in the United States. Taxonomy began to be restored to favor in the eyes of the laboratory scientists.

Now another cultural trend is beginning to be prominent: the drift to stereoptyped mass-culture, in part arising from the constant increase in population. In terms of botany, it means more and more Ph.D.'s being ground out according to remarkably uniform pattern — taught out of mass-produced, standardized textbooks, in stereotyped courses. Taxonomists grow up with dogmas (myths, really) floating in the air, never set down in clear terms and never critically examined or even

questioned: taxonomy had gone bad; one must lean over backward to avoid publishing unnecessary names or describing too many species; one had to specialize in order to be really scientific; one did not waste time on introduced plants; phylogeny was the real thing, work on general floras was bad. And in line with the growing American tradition, one mustn't criticize. The Age of Dilettantes is passing into the Age of Conformists, in which often excellent but specialized work goes hand in hand with uncritical conformity and intellectual shallowness.

What I have described is really the cultural history of Northern botany. For the South there was the long stagnation from the 1830's to the 1940's. But the illustrious early period with Stephen Elliott, and the immense spurt of activity since World War II, make it plain that the long stagnation was something forced by special factors, not evidence of lack of capacity. By reason of this very gap in its past, the New South has a lively history ahead of it, and we can not only see that history beginning to take shape; we can perceive the details and the reasons for them. It is no accident that two of the four largest herbariums in the South are in Texas and two in North Carolina; that those in Texas began their current growth earlier; that there are more native sons among the taxonomists in those two states than in any others in the South; that a descriptive flora of West Virginia is nearly completed, while the Old Dominion has nothing comparable now or in prospect; that Florida, North Carolina, Tennessee, and Texas lead in the number of active botanical centers. These are wholly expectable consequences of economic progress¹⁸ in areas least dominated by the Planter Aristocracy. But the whole South is becoming urbanized and industrialized, and the pattern of change keeps spreading and intensifying. Historians of the future may find the current progress of botany at the University of Georgia even more notable than the examples just cited.

The South's needs botanically are decidedly regional, something out of step with the national trend to uniformity. The South has also been a stronghold of individualism as well as states' rights, again out of step with the national trend to mass-culture. And more than any other section, it has a great awareness of history.¹⁹ These ingredients in the intellectual atmosphere are added sources of strength to those who have the special advantages, in performing belatedly a necessary scientific task, of modern facilities and, not least, the lessons of history.

In so applying the lessons of history, something new is introduced into American science. Plainly the opportunity before Southern botany is not simply to imitate what has been done before, or to fall in with the Age of Conformists. The more independent it is, the more it draws on those regional cultural peculiarities that offer strength and encouragement, the greater its scientific achievement will be.

APPENDIX ONE

CALAMITY AND SOUTHERN BOTANY

Chance undoubtedly plays a part in history, and in the history of Southern botany, ill chance has figured more largely than for any other section of the country. Jones and Meadows, in tabulating American institutional herbaria, note that seven had been partly or wholly destroyed by fire in the first half of the 20th Century. Four of these were in the South (Clemson College in South Carolina, University of Tennessee, Tuskegee Institute in Alabama, University of Kentucky). To these may be added the Biltmore Herbarium in North Carolina, partly destroyed by flood, and never restored. For one half-century period alone, a quarter of the country was victim of more than half the major catastrophes. In the 19th Century, important collections made by Darby and Buckley were lost while being shipped north. The deliberate destruction of most of Rafinesque's herbarium must also be counted as a Southern calamity, for Rafinesque had made particular effort to obtain Southern collections, and had named many species from the region. Having at all times much less than the North or the Pacific states, the South could not afford to lose even an equal amount with them, but it lost much more.

The premature deaths of men of great promise has darkened the history of botany in all sections, and the South had its full share — Thomas Walter, Hardy Croom, W. B. Fox, to mention but one for each of the three centuries in its history. As with the lost collections, the small numbers of those who pursued botany in the South made the loss of each one greater than if it had occurred elsewhere.

In commenting on Reinhold Niebuhr's thesis that the American people have had too happy a history, and are therefore not really prepared for world leadership, C. Vann Woodward points out that the South, having suffered defeat and ruin in the Civil War, is different and unique in just this respect. It is a strange coincidence that the history of Southern botany, quite apart from the episode of the War, should be more touched with tragedy than that of any other section.

APPENDIX TWO

THE PATTERN OF ALIENS AND FRONTIERSMEN
IN SOUTHERN BOTANY

What is a *Southern* botanist? The best answer I think lies in Oswald Spengler's conception of race, as the manifestation of a distinctive culture, not a matter of blood. "It is what one *has*, not what one *is*. . . . The one is ethos; the other — zoology." This hardly fits the dogma of Anglo-Saxon supremacy and the preoccupation with family ties so typical of the Planter Aristocracy of the Old South. As a matter of historical record, even they did not practice what they proclaimed. There was

the embarrassing French origin of the old Huguenot families who were numerous and prominent in South Carolina high society; but at least they were old, and the definition of Anglo-Saxon could be stretched just enough to include them. General Beauregard, handsome and with polished manners, in charge when Fort Sumter was fired upon, popular hero and darling of Charleston society, was a Creole from Louisiana. Jefferson Davis, President of the Confederacy, came of an upstart Western family, only one generation settled in Mississippi, and while regarded with condescension and mistrust by the older aristocracy, nonetheless was made President, later to become not only apologist but prime symbol of the Plantation Aristocracy.

Such unsettled social conditions of course reflect the frontier status in which the South remained so long. The pattern in political life was duplicated in botany, and has been consistently followed for two hundred years. Thomas Walter was an English immigrant, Stephen Elliott, a native son; Darby and Chapman were Yankees, while Rugel, Gattinger, and Mohr came from Germany, and the two Michaux from France. There is special attraction for botanists in frontier country with still unknown plants, of course. But there is also a non-scientific factor in the attraction of frontier conditions for individualists, and taxonomic botany has been overwhelmingly carried on by men who were strongly individualistic. A running theme in Geiser's *Naturalists of the Frontier* is that of gifted men crushed by unfavorable frontier conditions, men who in more civilized surroundings might have risen high. But with civilized society they might have proved temperamentally incompatible; it was in their character to choose the frontier, and their achievements there as likely as not greater than they might have been in different circumstances.

Texas inevitably offers the most spectacular illustration of the pattern of aliens and frontiersmen, and the changes now under way. It had no native botanists until well into the 20th Century. Berlandier came from Switzerland (born just across the border in France), Drummond from Scotland, Lindheimer and Roemer from Germany, Reverchon from France; Dr. Edwin James, Charles Wright, Buckley, and Riddell were from the Northeastern United States, and Gideon Lincecum was born in Georgia. After nearly a century and a half of botanical exploration, the picture today is in part one of extreme contrast, in part one of the continuation of old patterns. Texas today has more native-born taxonomic botanists than any other state in the South, almost more than all the rest combined, even if we count only those who have recently published books about or described new species in its flora (M. C. Johnston, Fred Jones, C. L. Lundell, Ellen Schulz Quillen, Chester Rowell, B. C. Tharp, B. L. Turner, Barton Warnock, Eula Whitehouse). In a remarkable illustration of "curious chances," the alien element is represented by three Canadian-born botanists (Walter Lewis, Lloyd Shinnars, Alfred Traverse⁸⁰), one from each of the three major sections

of Canada (British Columbia, Prairie Provinces, Eastern Canada), working respectively at a state college, a private university, and a private research corporation, and pursuing three different aspects of systematic botany (cytotaxonomy, classical taxonomy, paleobotany). The out-of-state Americans are represented by a North Carolinian (D. S. Correll) and a Louisianan (R. A. Vines) in the Lincecum tradition, while a Yankee from Indiana (N. C. Henderson) is the most recent addition to the roster of Texas systematic botanists.

The pattern in the rest of the South is less extreme, but similar. There are fewer native-born botanists, and almost no aliens, while immigrants from the North are a large contingent, continuing the pattern that goes back nearly a century and a half. In time we may expect the native sons to become a majority,²¹ but it is unlikely that there will ever be an era of exclusively home-grown botanists. Even Britain, the world's most prolific producer of botanists, in her Golden Age, had such men as the Germans Seemann and Stapf. Although Rafinesque complained²² of "not having been able to explore as yet the Southern States, deterred by the bad roads, unhealthy climate, scanty fare, heavy expenses and state of society. A pedestrian Botanist is not always very welcome there," the South has traditionally been hospitable to botanists, even enduring the rabid Unionist and Yankee A. W. Chapman all through the Civil War. It is a tradition likely to continue.

After this brief additional sampling of the historical record, we may answer the question posed at the start. A Southern botanist is one who lives in the South and devotes himself to botany. Origins may be incidentally interesting, but are not involved in the definition.

Commentary on aliens and frontiersmen would be incomplete without some mention of those whose families have been in America several generations longer than the family of the present President of the United States or the families of most of the nation's citizens, but who scarcely enjoy the usual status of early settlers. The blighting influence of the slave economy on Southern whites has already been noted. For the negroes it was of course much more extreme, and made worse by racist attitudes on both sides. We have seen how, in terms of botanical history, the release of the Upland White from long cultural suppression has begun to have positive results. We may well expect that the longer and more severe cultural suppression of negroes will be followed by a longer period of recovery. But recovery is visibly under way, and like so much else in the New South, at a quickening pace.

I vividly recall an incident that took place a year or two after I came to Texas. I was showing a Northern visitor some native weeds in a vacant lot in Dallas. While we were on hands and knees digging specimens (as I recall, the plant was our attractive though small-flowered native bindweed, *Convolvulus hermannioides*), a young colored lady stopped to watch, and at length asked what we were doing. We explained as well as we could. "Oh," she exclaimed, "I just love flowers

and wish I could know more about them!" Such had been my own feelings from earliest childhood. But for her there was no chance; for her children, perhaps.

Another incident, a year or two later, in St. Louis, on a Sunday afternoon. I had gone out North Broadway Street to collect bees and wasps in waste areas fringing the Mississippi River bottoms. Waiting at the street-car stop to go back into town was a colored man of indeterminate but considerable age. He could hardly wait for me to come up before breaking into angry speech about a miserable patch of corn across the street underneath a huge cottonwood tree. He was up from Mississippi to visit relatives; back home they knew how corn ought to be grown, and planting it under a cottonwood was all wrong. "It cain't 'cumulate,'" he insisted repeatedly, indignant that anybody should treat corn like that, "it cain't 'cumulate!" Illiterate he might have been; unintelligent or incompetent he certainly was not. And again the natural love of plants was plain to see.

Just as this paper was beginning to be written, there was showing close to campus the motion-picture version of the prize-winning Broadway play, *A Raisin in the Sun*, written by and about negroes. Some weeks earlier I had heard its author, Lorraine Hansberry, in a radio interview, telling with bitter intelligence some of the personal beliefs that had been voiced in the play ("Why give God the credit for the things man does for himself?"). Memorable in the picture is the scene in which the matriarch, defending a bedraggled house plant in their Chicago flat from the cynical daughter, exclaims, "It expresses *me*!"

On my latest visit to Montgomery, Alabama, first capital of the Confederacy, a local newspaper had this to report (19 July 1962): "Two years ago, Bullock County had around 2,200 white and five Negro voters. It now has about 2,100 white and around 1,000 Negro voters."

The interest is there, the ability is there; the opportunity has been wanting, but is plainly on the way. The next Southeastern flora will still be hardly past the pioneer stage. It may well be that the first definitive Southern flora will be written a generation (or two, or three) hence by a colored botanist, quite possibly one born in Mississippi.

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Since the titles and dates for the various manuals and floras are given in the text, they are not repeated here. Many of the titles in this list are not specifically cited in either the text or the notes, but they were among the most helpful to me in trying to understand Southern culture and history. To those who do not know the South, and to those who think that they do, I strongly recommend the very recent books dealing with the South and the Civil War listed below. Today's Southern intellectual has moved far beyond the rather naive and limited viewpoint of the Twelve Southerners who in 1930 published *I'll Take My Stand*. But he belongs to a small minority; the South in general still is far behind. Botanists, being themselves a small minority, should feel special kinship with the historians, sociologists, and men of letters.

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NOTES

¹ "The Mason-Dixon Line is, in a way, biological as well as political. Its vicinity is the dividing line between early seasons southward and later seasons northward, in the first half of the year and vice-versa in the second half." (Small, 1923, p. 194.)

² For numerous indications of this, see Dupree's biography.

³ Quoted by Lyon, 1939.

⁴ Rodgers' biography attempts to make a shining hero out of Coulter, but fortunately records enough facts so that something nearer the truth can be read between the lines. Two items may be cited in particular. In his early career, Coulter several times obtained special funds from his institution of the time to build up the herbarium, which he proceeded to take along as personal property when he left, ultimately selling it to the Field Museum in Chicago. None of the major discoveries for which he became famous in his post-taxonomic period was reported in a paper by Coulter alone; all were joint-authorships with a graduate student. Marcus E. Jones had this to say (*Contrib. West. Bot.* 15: 75, 1929): "Coulter seems to have been the one who started the nefarious scheme of taking part of the credit for work he never did, and which went into disrepute with Scribner. Rose was his pupil, one of the best, and took up the Umbelliferae. Coulter's part in this publication was that of sitting once in a while with Rose while Rose explained the work he had done on the genera. Coulter's chief part in the deliberations was smoking rank cigars and stinking up the room with tobacco smoke. It was the same method which produced Coulter's *Flora of Texas*, but to date no one has ever claimed being the clerk who got it out." Coulter's *Botany of Western Texas* (*Contrib. U.S. Nat. Herb.* vol. 2, 1891—1894) is such a poor piece of work that I am inclined to believe it was indeed his alone, and evidence of what the calibre of his work was when he did not have more talented associates to exploit. On the basis of the record, it appears that his famous last words ("I should like to be of service") omitted two important ones: "to Coulter."

⁵ Despite his usual good humor and geniality, Gray could at times be ruthless and even vindictive. His treatment of S. B. Buckley is a clear case in point. Gray evidently believed that with the many collections from Texas in his possession (those of Berlandier, Drummond, Leavenworth, Lindheimer, Wright, and others), he had a pretty complete representation of the state's flora. He was incensed when Buckley published numerous new species without consulting him and without supplying a good set of specimens, so much so that in a paper in the Proceedings of the Philadelphia Academy he denounced Buckley, dismissed his new species as worthless, and all but ordered the Academy not to publish any more of Buckley's work. The Civil War supervened, and it was some years before Buckley was able to defend himself. He pointed out that the main shipment of his specimens had been lost in transit, so that he had to get along with mere scraps that he had kept with him for

study; this was the reason for the poor quality of his specimens, which Gray had particularly noted, and for his failure to distribute duplicate sets. We can add today that Gray was mistaken about the Texas flora; a large proportion of Buckley's new species were perfectly good, and are recognized today. One cannot help wondering if Darby also was unfairly condemned, but unfortunately we do not have even poor fragments of his specimens.

⁶ See the reminiscences of Chapman by Kimball, and of Small by Wherry.

⁷ See the introductory remarks in Pennell's "Scrophulariaceae of Trans-Pecos Texas."

⁸ In a quick compilation I find just eight living American botanists who have authored a descriptive flora or manual of a state or region: Davis (Idaho), Harrington (Colorado), Munz (California), Stevens (North Dakota), Strausbaugh and Core (West Virginia), Gleason (The New Britton & Brown), Cronquist (its companion Manual). Half of these men are now retired. (The concluding volume of the West Virginia flora, and Cronquist's Manual, are reported in press as I write this: October 1962.)

⁹ Personal communication from Dr. Robert E. Woodson, Jr.

¹⁰ See also my acid remarks on the generic flora in connection with *Drosera*, this journal pp. 53-59.

¹¹ Julia Hale's *The Peterkin Papers* is the classical work depicting the mania for learning. See further in Van Wyck Brook's *The Flowering of New England*.

¹² *Biltmore Botanical Studies* ran to just two numbers, published in 1901 and 1902. A detailed history of the very unusual institution which issued them is greatly to be desired; almost no information about it is available in print.

¹³ In the first 21 volumes of *Contributions from the U.S. National Herbarium*, two short papers by E. S. Steele (in volumes 13 and 16) are the only ones that deal chiefly or exclusively with plants of the Gray's Manual range. There are eight papers, some quite long, devoted to plants of the South (including Texas), plus three whole volumes (Botany of West Texas, Plant Life of Alabama, Flora of the District of Columbia). In addition, a number of monographs (that of *Panicum*, for example) are of groups most prevalent in the South. Later volumes of the Contributions have come to deal almost exclusively with foreign plants, chiefly Latin American.

¹⁴ "This made for a society gay and polished, even brilliant . . . The surprising thing is that this society was so sterile intellectually." (Fletcher Pratt, *Ordeal by Fire*, p. 181.) "The South, like most aristocracies, was deficient in education, both of the corporate body and of the individual member." (Ibid., p. 280.) "They were kind, hospitable, liberal and honorable. But it also noted that their lives were trivial, involving nothing more important than the concoction of mint juleps. They visit each other, eat, drink and are merry, and that is all. They have excellent qualities, but no occasion calls them forth." (Review of John Pendleton Kennedy's *Swallow Barn, or a Sojourn in the Old Dominion*, summarized and quoted in Howard Floan's *The South in Northern Eyes*, p. 91.)

¹⁵ "Thus when the frontier period passed . . . the Old South had had as investigators a considerable number of gifted and vigorous workers. The South, however, had become pre-occupied with the States' Rights movement. . . . From this time educational movements in the South dwindled." (S. W. Geiser, *Naturalists of the Frontier*, Chapter 13, Notes on Scientists of the First Frontier, p. 263.) An interesting and rather depressing illustration of the tenacious survival of the Old South's mental rigidity is to be found in Herbert Ravenel Sass's *Adventures in Green Places*. This is a series of essays on the natural history and antiquities of the South Carolina low country, in which, incredibly, there is not even the mention of the names of Thomas Walter and Stephen Elliott, nor even of the author's kinsman, Henry William Ravenel. In one footnote (p. 101) we are told primly about the name of William Mazyk Porcher that it is "a French Huguenot name and therefore to be pronounced Porshay," but nothing is said of Dr. Francis Peyre Porcher who, to help the Confederacy, prepared *Resources of the Southern Fields and Forests, Medical, Economical and Agricultural*, published at Charleston in 1863 (followed by a new edition in 1869). An entire chapter is devoted to Plantation Pageantry (pp. 92-119), the make-believe knightly tournaments which were among the highlights of ante-bellum social life. At the end is inserted a defense of Calhoun! That a man with pretensions of scholarliness should, in a book of local natural history, omit all mention of the most illustrious naturalists in the past, and come to the defense of social frivolities and Calhounism, is striking evidence of how the culture of the Old South could restrict intelligence.

¹⁶ "The new leadership of the South was to be more enterprising, less cultured, but cautious and tight-fisted. . . . On the other hand, these people did not share the ante-bellum Democrats' opposition to Federal appropriations. . . . They would press steadily for the

segregation of the Negro and his elimination from politics, and they were not particularly interested in providing improved educational facilities." (Nichols, *The Stakes of Power*, pp. 212—213.)

¹⁷ Britton is an even more significant figure in American botanical history than Asa Gray, and a thorough-going biography of him is badly needed. About this very remarkable if not very admirable man I have been able to learn almost nothing of real significance. I have talked with several botanists who knew him, but they all suffered too much from what I have politely called "the narrow cultural limits" of American botany. They saw, but had no comprehension of what they were seeing. About one thing they agreed: "He was a driver," and those he employed were expected to produce. That he wanted quantity without regard to quality is apparent in the work of Rydberg and Small, and in his own taxonomic work. His own writings are dull as dishwater. His infrequent ventures into non-taxonomic discussion (see as an example "Darwin and Botany," *Ann. New York Acad. Sci.* 19: 28—33, 1909) display a thoroughly commonplace mind. He was a power politician first and foremost, who by some strange chance seized on botany as an ideal field in which to exercise his talents.

¹⁸ Though economic conditions are important, and I refer to them repeatedly, they are not everything. I quite agree with the views of Fletcher Pratt (see the introduction to his *Ordeal by Fire*); other things may outweigh economic considerations. We have a neat illustration of this in the contrasting condition of systematic botany in two Southern states which rank among the poorest economically. West Virginia is one of the leaders, with an established, important botanical journal (*Castanea*), and a keyed, descriptive, illustrated state flora. Arkansas ranks near the bottom. The lingering effects of past history are plain to see. West Virginia represents one non-slave-holding portion of the pre-war South which broke away from Virginia to remain with the Union; Arkansas joined the Confederacy, and though only in part a plantation state (in the 1850 Census it ranked 12th in number of slaves; only Florida, the District of Columbia, Delaware and New Jersey ranked lower) it accepted the political and inevitably the cultural domination of the Plantation Aristocracy, with its blighting influence on the intellectual climate. In explaining West Virginia's achievements despite handicaps, we must certainly include the role of active individuals as a major factor.

¹⁹ It is interesting to note that of the tiny handful of living historians of American botany (Dupree, Ewan, Geiser, McKelvey, McVaugh, and—on the strength of this paper—Shinners), one half now reside in the South (Ewan, Geiser, Shinners), and two more formerly did (Dupree, as student at Texas Technological College; McVaugh, at the University of Georgia). When we add the Southern awareness of its history to Western preoccupation with history, inevitably we find Texas again has had major attraction. It can hardly be pure chance. However subtly the ingredients of intellectual climate may function, we have visible evidence that they do.

²⁰ Dr. Lewis is currently on extended leave in Europe and Africa. Dr. Traverse has very recently (September, 1962) left the Shell Development Company to train for the Episcopal ministry.

²¹ Exportation of Southern brain-power has been one reason for the low number of Southern botanists who are Southern born. The present Head Curator of the New York Botanical Garden is a native of Georgia.

²² See his *New Flora of North America (First Part)*, p. 11. Had Rafinesque come on horseback, he might have been somewhat more kindly received. In the South, a gentleman did not travel on foot.